

Argon and YAG Laser Photocoagulation and Excision of Hemangiomas and Vascular Malformations of the Nose

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A total of 22 patients—19 children, 3 adults—with a variety of hemangiomas and vascular malformations of the nose were treated over a 5-year period. Various laser modalities were used. Some lesions could be photocoagulated by the argon or the yttrium-aluminum-garnet (YAG) laser. Larger lesions were resected with the YAG laser and sapphire tips. Preliminary arteriography with superselective embolization was necessary in 1 patient. Total removal was possible in 13 patients, and no complications or side effects were noted.

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Nasal hemangiomas present surgeons with a difficult therapeutic dilemma. Although many will involute spontaneously, others will not. Their rapid growth may be alarming and deforming, with distortion of adjacent nasal structures (nostrils, alar cartilage) that can have long-term residual effects. In addition, the obvious visible deformity in the center of a child's face presents a severe emotional burden initially for the parents and secondarily for the child as peer curiosity and ridicule are directed toward the deformity. Satisfactory reconstructive and cosmetic results have been achieved in a series of 22 patients treated for various nasal vascular lesions with the yttrium-aluminum-garnet (YAG) or argon laser.

Patients and Treatment

Over a five-year period between 1988 and 1993, 22 patients—15 female, 7 male—were treated. There were 3 adults aged 19, 24, and 34 and 19 children aged 6 months to 10 years (average, 26.6 months). The diagnosis was either capillary hemangioma or venous malformation in 16 patients, vascular malformation in 5 patients, and arteriovenous malformation in 1 patient. Six lesions were located on the tip of the nose, 15 on the dorsum, and 1 at the base of the nostril. Complete shrinkage or removal was achieved in 16 patients, and in 6 patients, treatment resulted in subtotal removal or shrinkage. Early in the series, 3 patients underwent argon laser photocoagulation (Figures 1 and 2). Argon laser photocoagulation is not usually used, with the more modern tunable dye laser being favored for photocoagulation. Five patients underwent YAG laser photocoagulation plus the intralesional administration of steroids (Figure 3), followed by YAG laser resection in 3 patients. A total of 16 patients had

YAG laser resection (Figures 4, 5, and 6), and 1 patient had previous superselective embolization.

Discussion

The natural history of vascular abnormalities of the head and neck has been well described. The current classification divides the lesions into two main categories.^{1,2} Vascular malformations may or may not be present at birth, but continue to grow during life, with occasional growth spurts at certain times. They contain mature-appearing, orderly, nonproliferative endothelial cells lining the vascular spaces with a relatively low number of mast cells. Hemangiomas are usually not present at birth, contain less orderly, immature, proliferating endothelial cells, and a relatively high number of mast cells. These lesions progress and enlarge rapidly and may then involute totally or subtotally.

Nasal vascular lesions present a particularly difficult dilemma. Although many may be hemangiomas, which means that they may eventually involute, their growth and subsequent deformity with the distortion of delicate nasal architecture often demand treatment. Similarly, subtotal involution still leaves a visible deformity. True vascular malformations do not involute, and their subsequent hypertrophy makes resection more difficult in the future. Regardless of the natural course, children and their parents must suffer the emotional distress of a visible facial deformity in the center of the face. Thus, debate has focused on surgical versus nonsurgical treatment of these disorders. All patients' families must be advised about the natural course of spontaneous involution before any intervention is attempted. Such regression may be delayed as long as 8 to 11 years and in some lesions may never occur.

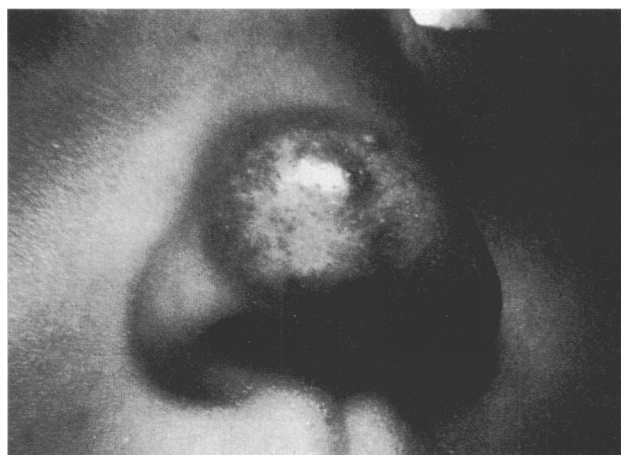


Figure 1.—Left, A capillary hemangioma of the nasal tip is shown in an 8-month-old female child before laser treatment. Right, The long-term result is shown in the child, now aged 9 years, without residual skin-texture change, scar, or deformity (argon laser photocoagulation).



A retrospective analysis was done in 1979 of 19 patients with nasal tip hemangiomas, 11 treated surgically, and 8 managed conservatively.³ Of the 8 patients who received no physical treatment, 5 had cavernous lesions and 3 had capillary or cavernous lesions. All patients' lesions reviewed at least six years after the original diagnosis had improved spontaneously to an aesthetically acceptable point, although a subtle fullness or bluntness could be detected in each nose. Of the 11 patients who were treated surgically, 10 had capillary or cavernous lesions and 1 had a cavernous lesion. Each patient had an average of four procedures, with half the surgical procedures being followed by delayed wound healing. In 8 patients, the surgical result was an improvement over the original condition, but in only 3 was it considered "aesthetically acceptable." In three other patients the results were neither surgically nor aesthetically acceptable. The authors' conclusion was to recommend "no touch" management of hemangiomas of the nasal tip. They did not discuss nasal hemangiomas in other locations on the nose. The series being reported comprised 6 patients with hemangiomas of the nasal tip and 16 patients with lesions in other loca-

tions on the nose. Also, surgical techniques have progressed greatly since 1978, and several operations (average of 4 per patient) with 50% delayed wound healing would be considered excessive today.

Good results were described following the resection of nasal tip hemangiomas with the use of a noncrushing clamp as an adjunct for hemostasis.⁴ Also, a giant hemangioma of the nasal bones was successfully removed, with a satisfactory cosmetic result.⁵

Serious consideration must be given to indications for laser treatment, either by photocoagulation or resection, versus "watchful waiting." Obstructed nasal airways, bleeding, and severe deformity of the adjacent cartilage or

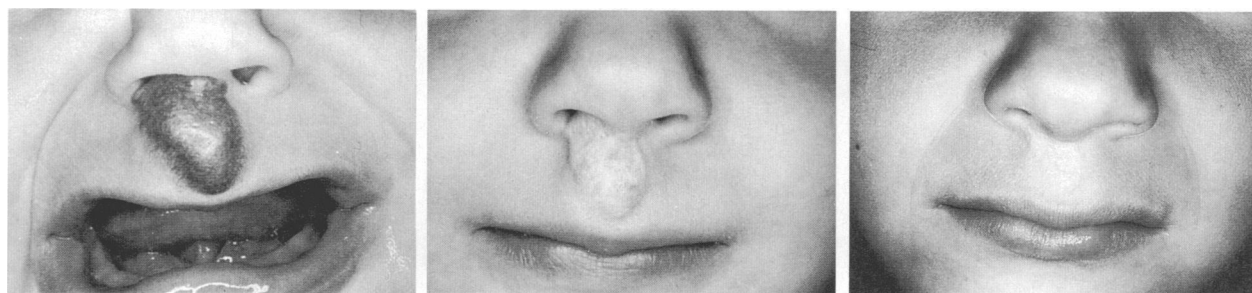


Figure 2.—Left, A capillary hemangioma totally obstructs the nostril and alar base in a 7-month-old child. Middle, Shrinkage and blanching were produced 6 weeks after argon laser photocoagulation. Right, The long-term result in the child, now aged 6, shows minor residual skin-texture change. (Photographs courtesy of M. R. Maser, MD, Palo Alto, California.)



Figure 3.—**Left**, A rapidly growing capillary or cavernous hemangioma is shown on the left ala in a 16-month-old child. **Middle**, Fibrosis, shrinkage, and blanching are present 4 months after yttrium-aluminum-garnet (YAG) laser photocoagulation plus the administration of intralesional steroids. **Right**, The final result after YAG laser excision with sapphire contact tips shows satisfactory nasal contour, total removal of the hemangioma, and minor residual scarring.



Figure 4.—**Left**, A capillary or cavernous hemangioma is shown on the nasal dorsum in an 18-month-old female infant. **Right**, The results 6 weeks after yttrium-aluminum-garnet laser resection with contact sapphire-tip laser show total removal of the hemangioma and minor residual scarring.

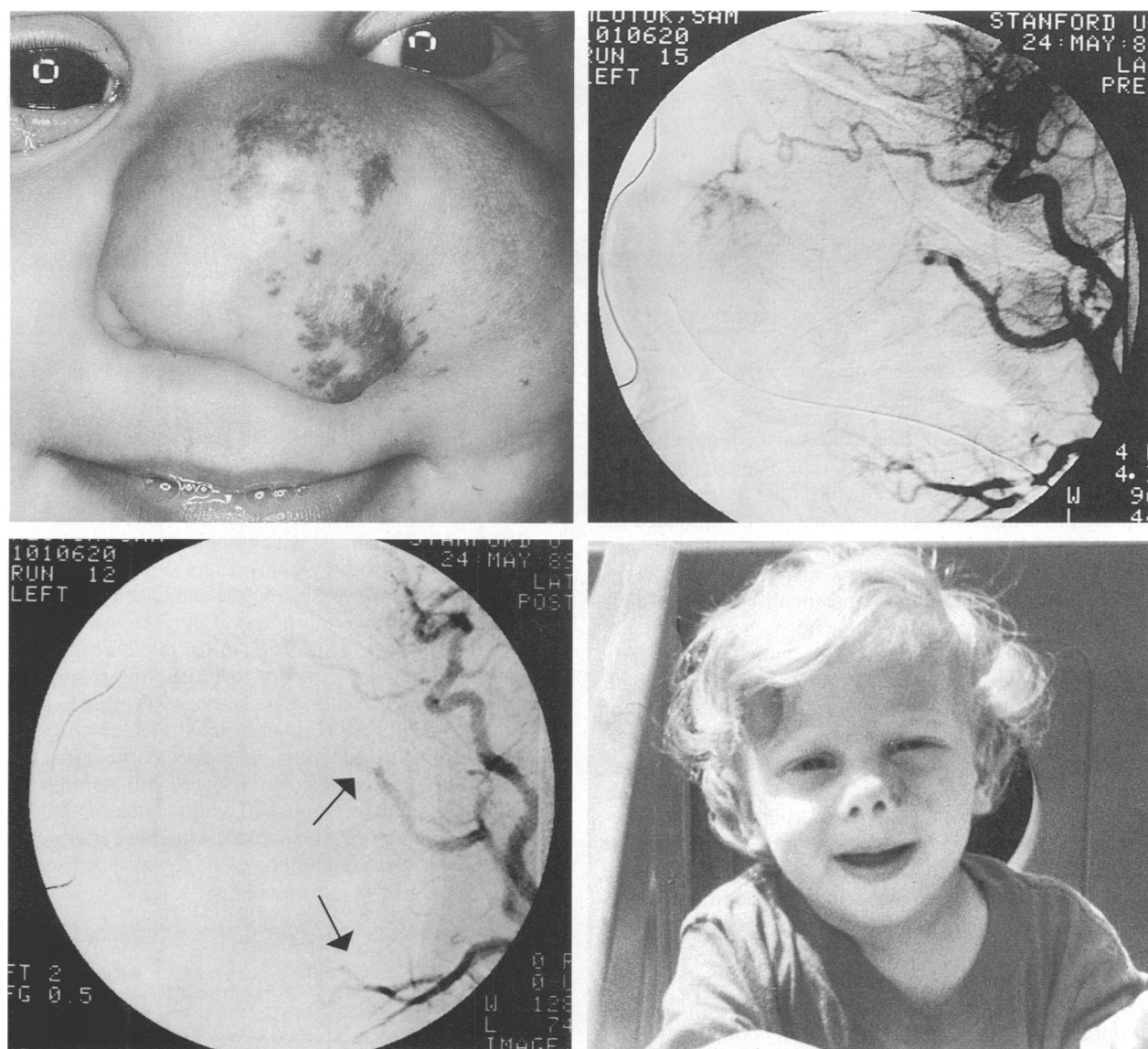


Figure 5.—**Top left,** A massive, continually growing vascular malformation totally obliterates the nasal architecture in a 13-month-old male infant. **Top right,** A preoperative arteriogram shows an extensive vascular supply from internal maxillary and facial arteries. **Bottom left,** A postembolization arteriogram shows occlusion of the major afferent supply and pronounced decompression of the hemangioma (arrows). **Bottom right,** The final appearance is shown 6 months following total resection of the hemangioma with yttrium-aluminum-garnet (YAG) laser contact sapphire tips and 100 ml of blood loss. There was complete removal of the hemangioma with a satisfactory nasal contour and minor residual deformity. (Photographs used with permission of *Plastic and Reconstructive Surgery*.^{20(p74)})

nasal bones that lead to growth abnormalities are absolute indications. Parental anxiety and the diagnosis of a vascular malformation (usually noninvoluting) are secondary considerations. Even natural involution may result in a shiny, atrophic redundant skin that is often as or more unsightly than the minor textured change seen after laser photocoagulation. Surgical resection can be planned from a nostril rim or open rhinoplasty approach, thus limiting visible scarring. The timing of intervention is planned when involution is unlikely (no decrease in size has occurred during a 1-year period of observation, or it has continued to enlarge) or when adjacent structures are compromised.

Nonsurgical treatment includes the administration of parenteral or topical steroids, sclerotherapy, pressure, the use of interferon alfa, and irradiation. Irradiation and pressure are probably contraindicated because of possible chronic injury to underlying cartilage and bone, resulting in later growth disturbances. Similarly, the use of interferon alfa is probably not indicated except for massive or life-threatening lesions.⁶ Sclerotherapy with agents such as a hypertonic saline solution, sodium tetradecyl sulfate, and the like, may be effective,^{7,8} but their use is difficult and painful in the nose. The intralesional administration of steroid may be effective in causing a cessation of growth, blanching of color, and initiation of subsequent

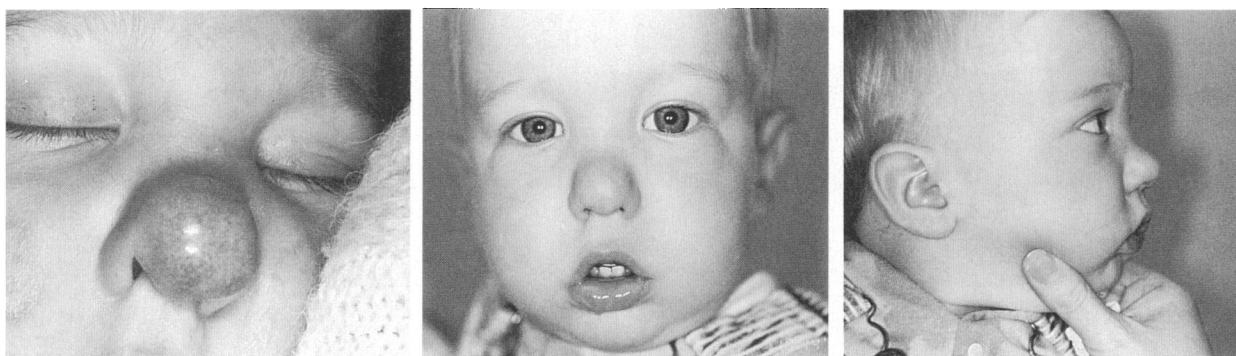


Figure 6.—Left, A capillary hemangioma is shown on the nasal tip in a 9-month-old male infant. Middle and Right, A satisfactory result is obtained following yttrium-aluminum-garnet laser resection.

involution.^{9,10} A series of injections may be required at intervals of three to four weeks. The use of parenteral steroids in doses of 2 to 4 mg per kg may be indicated for rapidly growing lesions, lesions that are complicated by bleeding or ulceration, or those that obstruct the nasal airway. Few long-term side effects such as growth disturbances, diabetes mellitus, or personality changes have been associated with such treatment.^{11,12}

Various lasers can also offer substantial benefit. Early recognition and immediate treatment of the flat, small, red or pink blush that often precedes the development of an obvious hemangioma may prevent any further development. For such treatment, the use of argon and tunable dye lasers has been advocated.^{13,14} Their depth of penetration to about 1 mm into the upper dermis limits their usefulness to thin, superficial lesions only, however. The YAG laser penetrates to 4 to 6 mm, thus rendering it more valuable in the photocoagulation of thicker, more hypertrophic lesions. Overlying skin always develops textural changes or scarring to some degree. More well-developed lesions may be fibrosed by photocoagulation with the YAG laser, often in conjunction with the administration of intralesional steroids.¹⁵ Elsewhere my colleagues and I described the use of a frequency-doubled YAG laser to treat a capillary hemangioma that had grown so rapidly as to cause a cleft of the ala.¹⁶ The hemangioma involuted after one treatment, with lessening of the nasal cleft. We subsequently reported a larger series of capillary or cavernous hemangiomas successfully treated with YAG laser photocoagulation plus the intralesional administration of steroid.¹⁵

The YAG laser may also be used in interstitial laser photocoagulation.¹⁷ In this technique, a bare laser fiber is passed directly into the depths of the hemangioma, and localized photocoagulation is done at various depths and levels in a radial spoke-like fashion. This intralesional photocoagulation results in dramatic shrinkage and fibrosis of the lesion. The YAG laser may also be used as a "light scalpel" because of its ability to cut and coagulate at the same time. Combined with sapphire tips in a contact mode, this laser has been reported to be particularly effective in removing vascular lesions.^{18,19} We have combined YAG laser excision with previous arteri-

ography plus superselective embolization to achieve further hemostasis.^{20,21}

Conclusion

We treated 22 patients with nasal hemangioma or vascular malformations by various lasers and laser modalities with satisfactory reconstructive and cosmetic results. Although natural involution may occur, growth and hypertrophy may cause a distortion of the nasal architecture or present emotional problems necessitating treatment. The argon, tunable dye, or YAG laser may be used to photocoagulate thin or developing lesions. Thicker or larger lesions may require interstitial laser photocoagulation, the administration of intralesional or parenteral steroids, or surgical excision accomplished with contact sapphire scalpel tips. Contact YAG laser excision plus arteriography and superselective embolization may also be used to control lesion growth and vascularity.

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The Prophet in His Own Country

Yes, I grew up in Rutherford,
 little New Jersey town,
 lots of weddings and funerals.
 It was the Twenties,
 before the world went gray.
 Sure, I knew Doc Williams:
 he took care of me
 when I was a little girl.
 I remember the doctor
 with gentle eyes
 Ma took us to
 when our heads felt hot.

He wrote poems?
 Wouldn't have thought
 he'd have time
 what with seeing all those babies.
 A book about Paterson?
 My husband's from there;
 maybe it mentions folks
 he used to know.
 Say, I ought to read it
 some time.

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